



Razeen® رزبين

*We protect... We care... We apply responsible care...*





*“Jana promotes product improvement  
without harming the environment”*

## About JANA

JANA - Jubail Chemical Industries Company situated in the Industrial City of Jubail, Kingdom of Saudi Arabia is an affiliate of Nama Chemicals and produces a range of Epoxy Resins - Liquid, Solution and Solid forms for a variety of applications.

JANA markets epoxy resins under two brand names - Araldite® and Razeen®. The Araldite® brand is over 50 years old and is used under the license of Huntsman in specific territories in Africa, Turkey, the Middle East and some parts of the former Soviet Union. Jana's Razeen® brand, under which it sells its own resins, was launched in the year 2004. Razeen® resins are manufactured to the highest quality and environmental standards required by many of today's leaders in the coatings, resin, composite and civil construction industries on a global basis.



## Safety, Health, Environment and Quality

Nama and its affiliates are certified with ISO standards 9001 (Quality), 14001 (Environment Protection), 18001 (Occupational Health and Safety) and together these form the company's Integrated Management System.



Jana as a company dedicated to all aspects of health, safety and environmental issues subscribes to the Responsible Care programme and ensures that all of its products meet the demanding requirements of the appropriate regulations globally. These include REACH, RoHS, CONEG and a variety of other specific programmes which form part of Jana's Product Stewardship programme designed to offer the safest solutions for every application.



*“Epoxy resins are used extensively  
for a variety of applications”*

# Applications



Epoxy resins are thermosetting resins cured and converted to a thermoset state by chemical reaction between the resin and a curing agent. Depending upon the curing agent, this reaction can take place at elevated or at room temperature.

Most commonly used types are based on epichlorohydrin and bisphenol A and are available in a range of molecular weights. The low molecular weight resins are liquid and high molecular weight resins are solid.

The brochure covers our standard range of products, however, tailor made products can be produced to customer specification if technically and commercially viable.

There are a number of properties of epoxy resin systems that influence the choice over other technologies in its application:

High chemical resistance against a wide range of corrosive conditions. This is derived from its chemical structure - Aromatic backbone and the phenolic ether bond for chemical stability.

Very good adhesion to a wide range of substrates - metal, wood, concrete, glass, ceramic and others. This is obtained due to the polar groups in the cured resin.

- Low shrinkage and very good dimensional stability.
- Can be easily fabricated.
- Good physical properties such as toughness, flexibility and abrasion resistance.
- Good thermal properties.

The largest end-user industry is the paint industry but the electrical industry is not far behind. Epoxy resins are used extensively for a number of applications including those summarized below:

Coatings	- maintenance & marine, can/coil, automotives, pipes, rebar
Civil Engineering	- floorings, repairs, mortars, crack injection
Structurals and Composites	- laminates, filaments, moulds, pipes
Electrical / Electronics	- printed circuit boards, insulation, potting, encapsulation
Tooling & Adhesives	- moulding compounds
Resins	- esterification as vinyl or epoxy esters
	- acrylation for uv cure
	- adduct formation for curing agents
	- as curing agents for acrylic non isocyanate cure 2 component paints

The properties of the basic bisphenol A resins can be modified in a variety of ways including combination with reactive diluents, novolacs and bisphenol F resins. These modifications are usually made to achieve a result for specific applications including a viscosity reduction for self leveling flooring and vacuum impregnation, to enable the formulation of a high solids or 100% solids liquid paint formulation or to improve the surface activity of the resin and make the product self emulsifiable for the production of water based coatings.



*“Epoxy resins are cured by employing a reactive hardener”*



Epoxy resins are cured by employing a reactive hardener such as amines, acid anhydrides, phenolic resins which combine with epoxy and hydroxyl groups in the resin to form a thermoset product.

The most commonly used hardeners are polyfunctional amines, aliphatic amines, cycloaliphatic amines, aromatic amines, polyamide resins, acid anhydrides, phenolic resins, and few others. In order to get a finished product with durability and easy application, a number of other additives may be included such as Accelerators, Flexibilisers, Reactive Diluents, Pigments, Fillers, Solvents and other Additives.

### *Calculation of mix ratios for Razeer® Epoxy Resins*

The mix ratio between epoxy resins and polyamines, polyamides type hardeners is also known as PHR (parts per hundred) and it means the grams of hardener needed to cure 100 g of epoxy resin.

The calculation of PHR is based on the formula:

$$PHR = \frac{AHEW}{EEW} \times 100 (g^*)$$

or

$$PHR \times 10 = EI \times AHEW (g/Kg)$$

\*: grams of hardener needed to cure 100 grams of epoxy resin.

AHEW (g/Eq): Active Hydrogen Equivalent weight. (grams of hardener containing 1 active hydrogen)

EEW (g/Eq): Epoxy Equivalent Weight. (grams of epoxy resin containing 1 epoxy group). Also is known as WPE (weight per epoxy).

EI (Eq/Kg): Epoxy Index. (number of epoxy groups in one Kg of resin). Same concept of EEW but expressed in another units

The values of AHEW and EEW are available on the Technical Data Sheet and Certificate of Analysis of the resin and hardener. For example: if AHEW = 20.6 g/Eq and EEW = 186 g/Eq the PHR is:

$$PHR = \frac{20.6}{186} \times 100 (g^*) = 11.08 g \quad 11.08 \text{ grams of hardener are needed to cure 100 g of resin.}$$

When epoxy resin is diluted with a solvent or is blended with other epoxy resins, reactive diluents, etc. the value of EEW of the solution or blend has to be re calculated before calculating the PHR (mix ratio).

For blended systems or products containing either several epoxy types, pigments, solvents, etc. this becomes:

$$EEW_{blend} = \frac{\text{TOTAL WEIGHT}}{\frac{\text{WEIGHT A}}{EEWA} + \frac{\text{WEIGHT B}}{EEWB} \dots}$$

Total weight: sum of the weights of all components of the mixture.

A, B, etc.: are the different epoxy components of the mixture.

For example:

A mixture of 100 g of a resin A with a EEW = 186, 30 g of a resin B with EEW= 190, 75 g of resin C with a EEW = 125, 200 g of pigments and 50 g of solvent the EEW of the blend is:

$$EEW_{mix} = \frac{100 + 30 + 75 + 200 + 50}{\frac{100}{186} + \frac{30}{190} + \frac{75}{125}} = 351.2 \text{ g/Eq}$$

And if it is cured with a hardener with an AHEW= 114 the PHR would be:

$$PHR = \frac{114}{351.2} \times 100 = 324.6 g$$





# Liquid Resins

Jana produces a wide range of epoxy resins for every application including : solvent free coatings, water based systems, solvent based systems, vacuum impregnation, acrylation grades for UV cure resins, electro-deposition grades for vehicle coatings, adhesives, windmills and civil construction. With a track record spanning more than 60 years, epoxy resins are versatile and offer excellent adhesion, chemical resistance, safety and compatibility.

RAZEEN®	ARALDITE®	EEW * (g/Eq)	Viscosity. (25°C,mPa.s)	REMARKS
<b>UNMODIFIED LIQUID EPOXY RESINS - Bisphenol A type resins</b>				
LR 1100	GY 6010	182 - 192	11000 - 14000	Unmodified general purpose resin for coatings, matrix adhesives, civil engineering, filament, winding, acrylation, resin production and adhesives.
LR 1110		182 - 188	10000 - 12000	General purpose resin but with low hydrolysable chlorine content for electrical and electro-deposition (cathaphoretic) applications, composite pipes and acrylation.
LR 1120		176 – 183	9000 - 10500	Low viscosity resin for solvent free coatings, self-levelling flooring, construction repairs (crack repair injection compounds) putties, vacuum impregnation and UV resins.
LR 1130		182 - 192	11000 - 13000	Low hydrolysable chlorine and low colour for electro-deposition and UV cure epoxy acrylates.
LR 1140 B		175 - 185	8000 - 10000	Low viscosity for UV cure resins, high solids, Civil construction, self-levelling floors, composites & electrical applications. Reduced diluent demand gives cost effective solution for flooring.
LR 1150	GY 250	180 - 189	10000 - 12000	Medium viscosity universal resin for solvent free coatings, self-levelling flooring, construction repairs (crack repair injection compounds) putties, vacuum impregnation and UV cure resins.
LR 1160		184 – 192	12000 - 15000	Low hydrolysable chlorine content for UV cure resins, high solids, electrical and electro-deposition (cataphoretic) applications and casting.
LR 1166		189 – 196	9500 - 12000	Medium viscosity for general purposes. More resistant to crystallisation than LR-1150. Excellent mechanical/chemical resistance. Meets relevant requirements of FDA listings.
LR 1170		184 – 192	12000 - 16000	General purpose resin for coatings, matrix adhesives, civil engineering, acrylation, resin production.
LR 1200	GY 6020	185 – 200	16000 – 20000	High viscosity resin for adhesives, pre-pregs, tooling, mastics and civil engineering repair compounds.
LR 2180		290-335	Semisolid	Semisolid resin for adhesives, tooling, mastics, and for blending with oil free polyester & acrylic resins to improve adhesion and chemical resistance. Improved flexibility.
LR 2280		225 – 280	450 - 700**	Semisolid resin for adhesives, tooling, mastics, and for blending with oil free polyester & acrylic resins to improve adhesion and chemical resistance. Improved flexibility.

\*: Epoxy equivalent weight. Epoxy Index (EI) = 1000/EEW (Eq/Kg).

\*\* :40% solution in butylcarbitol. Viscosity: measured: ISO-12058-1.

All liquid epoxy resins supplied as maximum colour 100 Apha unless specified on the Technical Data Sheet.

# Liquid Resins

*“Jana produces a wide range of epoxy resins  
for every application”*

RAZEEN®	ARALDITE®	EEW* (g/Eq)	Viscosity. (25°C, mPa.s)	REMARKS
<b>UNMODIFIED LIQUID EPOXY RESINS – other types</b>				
LR 2282		165 - 175	2500 - 5000	Low viscosity bisphenol F type epoxy resin for high solids systems, blending and composites.
LR 2308		230 - 260	4000 - 8000	Aliphatic based epoxy resin. High solids coatings, UV stabiliser for external applications, stoving and in conjunction with acrylics.
LR 2310		130 - 150	200 - 450	Aliphatic based epoxy resin. UV stabiliser for external applications and electrical casting
LR 6138		175 - 182	20000 - 50000	Semisolid Phenol Novolac based multifunctional [≈ 3.6] resin. Good mechanical/chemical properties. Cost effective solution for blending with liquid resins for higher temperature applications and composites.
<b>MODIFIED LIQUID EPOXY RESINS</b>				
LR 2251		169 - 179	600 - 1200	Difunctional Reactive diluent modified epoxy resin, low viscosity, non-crystallising resin with good alkali & solvent resistance. Used primarily in solvent free coatings, self levelling flooring, vacuum impregnation and wind energy applications.
LR 2253		172 - 185	800 - 1400	Difunctional Reactive diluent modified epoxy resin, low viscosity, non-crystallising resin with good alkali & solvent resistance. Used primarily in solvent free coatings, self levelling flooring, vacuum impregnation and wind energy applications.
LR 2254		190 - 210	600 - 900	Monofunctional Reactive diluent modified epoxy resin, low viscosity, non-crystallising resin with good mechanical and chemical resistance and meets the requirements of the FDA. Used primarily in coatings & flooring for food and pharmaceutical processing areas.
LR 2255		182 - 200	5000 - 6500	Monofunctional aromatic reactive diluent modified epoxy resin. Medium viscosity. Cost effective for Solvent free, self-levelling, civil engineering. Balanced chemical resistance.
LR 2257		180 - 192	500 - 700	Monofunctional aromatic reactive diluent modified epoxy resin. Low viscosity, non-crystallising resin with good acid resistance but reduced solvent resistance. Used primarily in flooring, vacuum impregnation and as viscosity modifier in other systems.
LR 2258		178 - 190	900 - 1100	Same as LR-2257 but with higher viscosity. For mortars and repair compounds.
LR 2290		240 -270	Semisolid	Flexibilised epoxy resin suitable for anticorrosive primers, composites and high solids coatings. Colour is more yellow than unmodified resin.
<b>MODIFIED EPOXY RESINS</b>				
LR 2302		175 - 190	6.000 - 8.000	Medium viscosity blend of A/F type resins. High solids coatings, composites, civil engineering applications.
LR 2350		175 - 190	6.000 - 8.000	Improved chemical resistance A/F resin. Suitable for high solid coatings, composites, civil engineering and tank lining.
LR 2351		168 - 181	4.500 - 6.500	Premium AF blend for %100 solids coatings, composites, civil engineering and casting applications requiring high bond strength and chemical resistance.
LR 2352		170 - 185	6.000 - 8.000	High solid coatings, composites, civil engineering and casting applications. High cross link density.
LR 2783		185 - 210	800 - 1100	Low viscosity blend A/F resins modified with monofunctional reactive diluent. Good mechanical properties and chemical resistance. Civil engineering, adhesives and flooring. May be used in water dispersible systems.
LR 2740		190 - 210	800 - 1100	Cost effective version of LR - 2783. High solids, civil engineering, adhesives and flooring.
LR 2810		172 - 185	685 - 885	Premium A/F resins with difunctional reactive diluent. Good mechanical properties. High chemical resistance for tank lining, civil engineering, composites, adhesives and flooring.
LR 2810 LV		149 - 169	174 - 374	Extra low viscosity version of LR-2810. Good mechanical properties. For vacuum impregnation, %100 solids, civil engineering and high end composites composites.

\*: Epoxy equivalent weight. Epoxy Index (EI) = 1000/EEW (Eq/Kg).

\*\* : 40% solution in butylcarbitol. Viscosity: measured: ISO-12058-1.

All liquid epoxy resins supplied as maximum colour 100 Apha unless specified on the Technical Data Sheet.





## Diluents and Modifiers

RAZEEN <sup>®</sup>	EEW* (g/Eq)	Viscosity. (25°C, mPa.s)	REMARKS
<b>REACTIVE DILUENTS</b>			
<b>D 7103</b>	320 - 450	30 - 110	Propylene glycol diglycidyl ether. Moderate reduction of viscosity. Improved adhesion to metallic surfaces. Increased flexibility. Reduction of surface hardness and general resistance to chemicals.
<b>D 7105</b>	170 - 190	7 - 10	Orthocresylglycidylether, low viscosity good cutting power & solvent resistance.
<b>D 7106</b>	270 - 305	5 - 12	Aliphatic monoglycidyl ether of C12 - C14 alcohol. Excellent cutting power viscosity. Good flow and cutting properties. Good flexibility. Reduction in surface hardness and resistance to chemical agents. Low toxicity.
<b>D 7107</b>	130 - 145	15 - 25	Butanediol diglycidyl ether. Good cutting power. Good reactivity, process ability & surface hardness maintenance. Good chemical resistance and mechanical properties.
<b>D 7109</b>	150 - 170	20 - 30	1,6-hexanediol diglycidyl ether. Good cutting power, reactivity but slight reduction in hardness surface. Good mechanical properties.
<b>D 7110</b>	1000 - 1300	150 - 400	Higher MW version of Razeen 7103. Cutting power not as good as 7106 but provides excellent flexibility.
<b>D 7111</b>	424 - 575	40 - 70	Cardanol glycidyl ether derivative. Good plasticising effect.
<b>D 7113</b>	130 - 150	120 - 200	Propanetriol triglycidyl ether. High reactivity & cross-linking density giving good chemical resistance and mechanical properties. Lower cutting power than 7106.
<b>D 7115</b>	330 - 370	8 - 15	Aliphatic Monoglycidyl ether of C13 - C15 alcohol. Better crystallisation resistance and flexibility than 7106 but reduced resistance and surface hardness.
<b>MODIFIERS</b>			
<b>93700</b>	N/A	45 - 75	Cardanol liquid suitable for manufacture phenalkamines. Can be used also as modifier and accelerator for use in adhesives, coatings and various other applications including bonding of brake linings.
<b>4F</b>	N/A	100,000 - 500,000	Polyacrylate flow agent. Modifier for liquid and solid resins. Suitable for liquid and powder coatings.

\*: Epoxy equivalent weight.  $\text{Epoxy Index (EI)} = 1000/\text{EEW (Eq/Kg)}$ .

\*\* : 40% solution in butylcarbitol. Viscosity: measured: ISO-12058-1.

All liquid epoxy resins supplied as maximum colour 100 Apha unless specified on the Technical Data Sheet.



*"These versatile resins have been used in the most demanding environments"*

## Solution Resins

Jana produces epoxy solution resins based on Xylene to cater to the demands of the surface coatings industry. These versatile resins have been used in the most demanding environments with a variety of curing agents to suit the application, polyamidoamides for ease of use, amino resins, amine adducts, amines, phenol formaldehyde and phenalkamines for low temperature or high solids. The permutations illustrate the versatility of these grades and their importance to the coatings industry.

RAZEEN®	ARALDITE®	Solid cont.	EEW * (g/Eq)	Viscosity. (25°C,mPa.s)	REMARKS
SL 4071X75	GZ 471X75	75 %	600 - 700	5000 - 10000	Type 1 epoxy solution for metal, concrete, maintenance coatings, primers and finish coats and floors. Good corrosion resistance and adhesion with higher pigment loadings possible than SL 4171 X 75. Ideal for fabrication shops.
SL 4171X75	GZ 7071X75	75 %	600 - 670	8000 - 12000	Type 1 epoxy solution for general purpose coatings, maintenance coatings, primers, finish coats and flooring. Good lacquer dry properties and early mechanical handling, ideal for fabrication applications.
SL 4072X75		75 %	735 - 835	20,000 - 50000	Type 2 solid epoxy resin solution for general purpose coatings, maintenance coatings, primers, finish coats and flooring.
SL 4280X80	GZ 2808X0	80 %	234 - 258 <sup>+</sup>	625 - 1275	Improved chemical resistance and compatibility with acrylics and alkyd amino resins. High solids systems and marine anti-corrosive primers.
SL 4660X80		80 %	300 - 335 <sup>+</sup>	3500 - 7000	Semi solid epoxy resin solution often used as a modifier in oil free polyester or acrylic systems. Improves adhesion, flexibility, chemical resistance for marine and PC applications including putties and yacht repair compounds.
SL 4150X90		90 %	200 - 240	625 - 1275	High solids resin for reduced VOC emission, improved chemical and corrosion resistance especially tank linings. Also used as diluent in 1 type solid systems.
SL 2290X75		75 %	240 - 275 <sup>+</sup>	100 - 300	Flexibilised epoxy resin in xylene, suitable for anticorrosive primers and poorly prepared substrates. Colour is more yellow than unmodified resins. Gives high flexibility to epoxy systems. Lower solids version of SL 2290X90.
SL 2290X90		90 %	240 - 275 <sup>+</sup>	2000 - 5000	Flexibilised epoxy resin in xylene, suitable for anticorrosive primers and high solid coatings. Colour is slightly higher than unmodified resins. Gives high flexibility to epoxy systems especially suitable for ships / tanks and other substrates which move due to temperature or filling / emptying.

### Resins for water based applications

RAZEEN®	Solid content	EEW * (g/Eq)	Viscosity. (25°C,mPa.s)	REMARKS
LR 2783	100 %	185 - 210	800 - 1100	Liquid resin modified to be self emulsifiable with good mechanical properties and chemical resistance. Typical applications coatings where one resin can be used as solvent free, solvent based and water based "base" component with different curing agents, also used in civil engineering, flooring, adhesive and injection systems.
SL 2711W57	55 %	550 - 650	100 - 1000	Solid epoxy resin in water for coatings, flooring and anticorrosive primers. VOC free.
SL 2733W67	67 %	185 - 195	300 - 3000	Modified low viscosity type A epoxy resin emulsion. Suggested for flooring, high solid coatings and highly filled coatings for anticorrosive primers.
SL 2711WCA	50 %	550 - 650 <sup>+</sup>	100 - 1000	Modified epoxy emulsion for sand stabilisation, moulding, casting and dust suppression. May be used as is or as a water based 2 component system for longer & life higher strength.

\*: Epoxy equivalent weight.

Epoxy Index (EI) = 1000/EEW (Eq/Kg).

Viscosity measured: ISO12058-1

+ : On 100% solid basis.

"Araldite® is a registered trademark of Huntsman LLC or an affiliate thereof and may be used by Jana in Africa, Middle East & any country covered by the current licence agreement."



*“Epoxy plays an important role  
in prolonging the life  
of our investments”*



## Solid Resins

Solid resins are available in a wide range of molecular weights to suit every application from powder coatings and epoxy ester production to can and coil coatings meeting the requirements of the FDA. Functional powders play an important role in prolonging the life of our concrete structures and with improved flow, powder coatings are used increasingly in industries traditionally associated with liquid coatings including the automotive industry. Jana manufactures 7 and 9 type resins which can not only be used for food contact materials meeting the requirements of the FDA but also cured with poly-isocyanates to give urethane epoxies for pilings, pipes and marine applications..

RAZEEN®	ARALDITE®	EEW * (g/Eq)	Viscosity** (25°C, mPa.s)	Softening^ Point (°C)	REMARKS
<b>UNMODIFIED SOLID EPOXY RESINS - Bisphenol A type resins</b>					
SR 5061		450 - 500	160 - 250	77 - 82	Type 1. Typically used for anticorrosive primers, epoxy finishes, pre-pegs and epoxy acrylates. May agglomerate if stored at elevated temperature.
SR 5071	GT 7071	450 - 530	200 - 500	72 - 82	Type 1. Typically used in anticorrosive primers and finishes. May agglomerate if stored at elevated temperature.
SR 5062		530 - 600	250 - 340	80 - 85	Type 1 ½ better anti sintering than SR 5071. Same applications as SR 5061.
SR 5072	GT 7072	600 - 700	280 - 340	82 - 90	Type 2. Typically used to formulate solvent based anticorrosive primers and finishes and powder coatings with improved flow.
SR 5013	GT 7013	650 - 725	370 - 490 <sup>(1)</sup>	85 - 92	Type 3. Good gloss and flow. Suitable for general purpose and hybrids with good gloss.
SR 5004	GT 7004	714 - 752	500 - 600	95 - 106	Type 3 ½. Good gloss and flow. Suitable for general purpose epoxy and hybrids with good gloss and edge cover. Excellent compatibility with polyester.
SR 5014	GT 7014	725 - 775	500 - 650 <sup>(2)</sup>	≈ 90	Type 3 ½. Good gloss and flow. Suitable for general purpose and hybrids with good gloss.

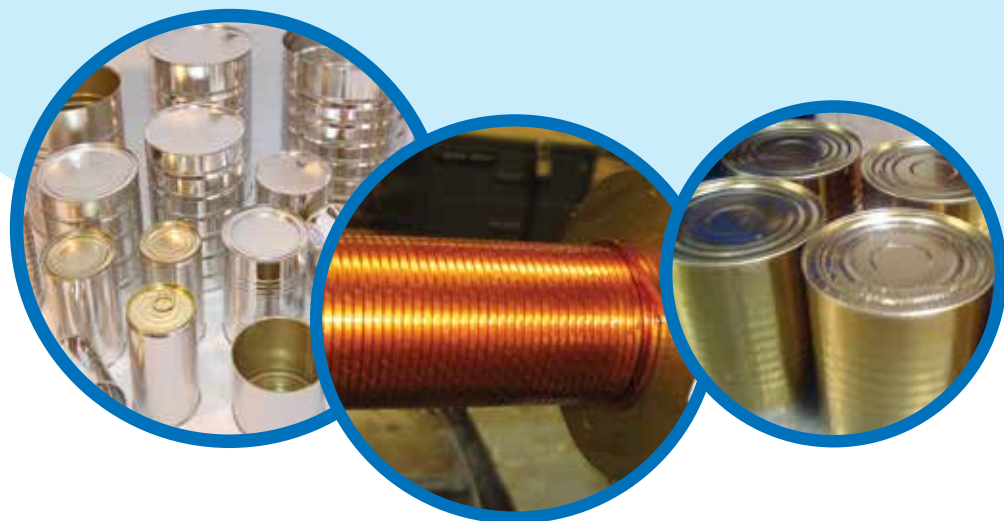
\*: Epoxy equivalent weight. Epoxy Index (EI) = 1000/EEW (Eq/Kg)

\*\* : 40% solution in butylcarbitol: ISO 12058-1

^: DIN 51920, Mettler Toledo type FP90.

(1): Cone and plate at 150°C (2200 – 3200 mPa.s).

(2): Cone and plate at 150°C (3100 – 4700 mPa.s).



# Solid Resins

RAZEEN®	ARALDITE®	EEW * (g/Eq)	Viscosity** (25°C, mPa.s)	Softening <sup>^</sup> Point (°C)	REMARKS
<b>UNMODIFIED SOLID EPOXY RESINS - Bisphenol A type resins</b>					
<b>SR 5084</b>		833 - 890	550 - 700	99 - 105	Type 4. Suitable for epoxy ester resins production and powder coatings applications. Hydroxyl content ≈ 2.9 and typical melt viscosity at 175 °C 1100 -1450 mPa.s.
<b>SR 5184</b>	<b>GT 6084</b>	835 - 895	550 - 700	99 - 105	Type 4. Suitable for epoxy ester production and powder coatings with good corrosion resistance and edge cover.
<b>SR 5214</b>		850 - 975	2000 - 4000 <sup>(4)</sup>	95 - 110	Type 4. Suitable for epoxy ester resins production and functional powder coatings. Higher molecular weight alternative of SR 5084 for improved impact resistance and post forming properties.
<b>SR 5074</b>	<b>GT 7074</b>	935 - 1175	900 - 1200 <sup>(3)</sup>	97 - 110	Type 5 ½. Suitable for functional powders with good adhesion, flexibility, improved impact resistance and edge cover with good cathodic disbonding performance.
<b>SR 5097</b>	<b>GT 7097</b>	1515 - 1920	1070 - 1760	100 - 118	Type 7. For can and coil coatings. May also used for “effect” powders and functional powder coatings including pipe coating,
<b>SR 5197</b>		1695 - 1885	1800 – 2600	100 - 118	Type 7 as for 5097 but improved post forming capability and impact resistance.
<b>SR 5198</b>	<b>GT 6609</b>	2380 - 2940	3500 – 5500	≈ 150	Type 9 with reduced viscosity for can and coil coatings. May also be used for ambient cure epoxy polyurethanes when cured with polyisocyanates to give excellent corrosion resistance and thin film weldable primers. Typical hydroxyl value around 3.2
<b>SR 5099</b>		2380 - 2940	5500 – 7000	143 - 158	Type 9 High and narrow molecular weight distribution. To replace resins made by taffy process. Good sterilisation results for food applications and inks. High mechanical and chemical resistance. For can and coil linings and all type of flexible packaging. Typical hydroxyl value around 3.4
<b>SR 5199</b>	<b>GT 6099</b>	2380 - 2940	5000 – 10000	143 - 158	Type 9. For can and coil coatings with improved mechanical properties. May also be used for ambient cure epoxy polyurethanes when cured with polyisocyanates to give excellent corrosion resistance and thin film weldable primers with highly flexible films. Typical hydroxyl value around 3.4

\*: Epoxy equivalent weight. Epoxy Index (EI) = 1000/EEW (Eq/Kg)

\*\* : 40% solution in butylcarbitol: ISO 12058-1

^: DIN 51920, Mettler Toledo type FP90.

(3): Cone and plate at 175°C (3000 – 6000 mPa.s).

(4): Values of Melt viscosity, Cone and plate at 175°C.



# Solid Resins

RAZEEN®	ARALDITE®	EEW * (g/Eq)	Viscosity** (25°C, mPa.s)	Softening^ Point (°C)	REMARKS
<b>MODIFIED SOLID EPOXY RESINS</b>					
SR 5034		690 - 770	350 - 500	85 - 95	Master batch with 5 % flow agent for hybrids and powder coatings. Decorative coatings. May agglomerate if not stored in cool conditions.
SR 5143		690 - 700	350 - 500	85 - 95	Master batch type 2 ½ with 2,5 % flow agent for improved flow in hybrids and white goods and good coverage. May agglomerate if not stored in cool conditions.
SR 5174		690 - 700	350 - 500	85 - 95	Master batch with 5 % flow agent for improved flow and easy production processing. May agglomerate if not stored in cool conditions.
SR 5334	GT - 6750	704 - 763	230 - 320	≈ 87	Master batch type 3 with 2,5 % flow agent recommended for hybrids. Excellent flow properties.
SR 5274	GT - 2874	740 - 870	350 - 550	85 - 95	Master batch with 10 % flow agent for improved flow and easy production processing. May agglomerate if not stored in cool conditions.
SR 5284		900 - 950	550 - 700	98 - 105	Master batch with 0,5 % flow agent for improved flow and easy production processing. Lower cross linker demand than other master batch products.
SR 5112		900 - 950	280 - 340	98 - 105	Master batch type with 0,5 % flow agent with narrow molecular weight distribution for high performance coatings.
SR 5584		443 - 567	480 - 630	84 - 90	Phenol novolac modified for functional powders with high chemical resistance and high Tg in finished film for higher temperature applications.
SR 5357	GT - 7255	775 - 885	1000 - 1600 <sup>(5)</sup>	≈ 110	Type 7 phenol novolac modified for functional powders with very high chemical resistance and high Tg.
SR 5257		500 - 550	460 - 670	85 - 92	Type 7 phenol novolac modified for functional powders with very high chemical resistance and high Tg especially suitable for 2MI free systems with higher thermal running requirements.

It is the responsibility of customer to satisfy himself that the product is suitable for the intended use. All information in this brochure is without guarantee.

\*: Epoxy equivalent weight. Epoxy Index (EI) = 1000/EEW (Eq/Kg)

\*\* : 40% solution in butylcarbitol: ISO 12058-1

^: DIN 51920, Mettler Toledo type FP90.

(5): Cone and Plate at 200 °C (2400 - 3700 mPa.s)



# Curing Agent - Hardeners

## Hardeners for 2 component liquid epoxy systems

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>CYCLOALIPHATIC AMINE TYPE</b>									
91618	Cycloaliphatic adduct	300 - 650	< 1	265	114	100	60	50'	Good yellowing resistance. For flooring and coatings. Food approved.
9215 F	Cycloaliphatic adduct	100 - 300	< 1	280	114	100	60	45'	Cost effective version of Razeen Cure 91618
943	Cycloaliphatic adduct	300 - 650	< 1	260	114	100	60	55'	Good yellowing resistance. For flooring and coatings. Good performance at low temperature and high humidity.
943 S	Cycloaliphatic adduct	400 - 1000	< 3	260	114	100	60	45'	Accelerated version 943, better curing at low temperature
93243	Cycloaliphatic adduct	100 - 300	< 1	330	95	100	50	60'	Low viscosity hardener for casting, self-levelling flooring and impregnation.
93243 S	Cycloaliphatic adduct	150 - 350	< 1	360	95	100	50	35'	Cost effective version of Razeen Cure 93243.
9145	Cycloaliphatic adduct	300 - 700	< 2	360	95	100	50	30'	For self-levelling flooring. Very good curing at low temp. High chemical and mechanical resistance.
914	Accelerated Polyamine	400 - 1000	< 4	385	76	100	40	15'	Early traffic resistance. Very good curing at low temp. High chemical and mechanical resistance.
914 MF	Cycloaliphatic Adduct	500 - 1500	≤ 2	380	76	100	40	15'	Same applications as Razeencure 914.
914 BABF	Accelerated Polyamine	600 - 1200	< 6	550	57	100	30	15'	Early traffic resistance. Very good curing at low T°. High chemical and mechanical resistance.
914 BMF	Cycloaliphatic Adduct	300 - 600	≤ 4	460	76	100	40	10'	Same applications as Razeencure 914.
914 BABMF	Cycloaliphatic Adduct	700 - 1200	≤ 4	550	57	100	30	10'	Same applications as Razeencure 914.
917	Modified Polyamine	20 - 100	< 3	668	84	100	25	55'	Low viscosity hardener, very good wetting properties and curing under adverse conditions.
9103	Modified Polyamine	20 - 100	< 3	600	47	100	25	55'	Cost effective version of Razeencure 917.
9117	Cycloaliphatic adduct	370 - 420	< 1	315	95	100	50	35'	Good yellowing resistance and very good levelling properties. Solvent-free systems, stone treatment, mortars.
9118	Cycloaliphatic Adduct	100 - 300	< 1	370	76	100	40	40'	Low viscosity hardener, very good levelling properties and curing under adverse conditions.
920	Cycloaliphatic adduct	200 - 600	< 2	310	95	100	50	30'	High mechanical properties for self-levelling, & low T°.
928	Modified Polyamine	20 - 120	< 2	360	76	100	40	130'	Low viscosity and long Pot life hardener. Good blushing resistance.
929	Modified Polyamine	200 - 400	< 1	500	57	100	30	15'	Very good colour and curing properties. Rapid cure.
946	Cycloaliphatic adduct	100 - 300	< 2	320	95	100	50	30'	For self-levelling flooring and thick film repairs. Very good performance at high humidity.
946 BF	Modified Cycloaliphatic	200 - 450	< 1	330	95	100	50	20'	Same applications as 946.
946 MF	Cycloaliphatic Adduct	150 - 400	< 1	300	95	100	50	25'	Same applications as 946.
946 BAF	Cycloaliphatic adduct	300 - 900	< 1	325	95	100	50	40'	Same applications as 946.
949 S	Cycloaliphatic adduct	200 - 400	< 2	325	95	100	50	25'	Fast curing version of 9450, very good hardening at low temperatures.
9161	Modified Cycloaliphatic	100 - 300	≤ 3	350	95	100	50	28'	General purpose hardener for flooring, epoxy-PU, adhesives, mortars. High chemical resistance.
9162	Modified Cycloaliphatic	100 - 300	≤ 3	400	95	100	50	22'	Version of 9161 with better curing properties at low T°.
9263	Cycloaliphatic adduct	40 - 120	< 1	370	95	100	45	30'	Low viscosity and colour, very good aesthetic properties and blushing resistance.
93290	Modified Polyamine/PAA	20 - 100	< 3	875	47	100	25	25'	Very low viscosity, for casting, injection, stone/ concrete treatment.
9450	Modified Polyamine/PAA	500 - 1500	< 8	285	114	100	60	40'	Very good curing low T° and under water, adhesion on wet concrete, blushing. Good blushing resistance.
9450 S	Modified Polyamine/PAA	200 - 600	< 8	330	114	100	60	30'	Fast curing version of 9450.
9450 LC	Cycloaliphatic adduct	250 - 500	< 1	310	114	100	60	40'	Good yellowing and chemical resistance. For flooring and coatings.
9450 PA	Modified Polyamine/PAA	1450 - 2350	<10	275	114	100	60		For solvent free and high solid systems with high water tolerance. Under water curing possible.
9450 SMF	Modified Polyamine	200 - 800	≤ 6	370	114	100	60	25'	Same applications than Razeen Cure 9450 S.
9450 SBMF	Modified Polyamine /PAA	300 - 600	≤ 6	370	114	100	60	20'	Same applications than Razeen Cure 9450 S.
9450 SBABMF	Modified Polyamine	1400 - 2600	≤ 8	450	95	100	50	20'	Same applications than Razeen Cure 9450 S.

**AHEW:** Active Hydrogen equivalent weight. **Mix Ratio:** with a resin of EEW = 190 **Pot Life:** sample of 150 g at 25 °C. **Description:**

**S:** Accelerated version.

**BAF:** Benzyl alcohol free.

**BABMF:** Bisphenol A, Benzyl alcohol, MXDA free.

**BF:** Bisphenol A free.

**BMF:** Bisphenol A. MXDA free.

**SBMF:** Accelerated version, Bisphenol A, MXDA free.

**MF:** MXDA free.

**BABF:** Bisphenol A, Benzyl alcohol free.

**SBABMF:** Accelerated version, Bisphenol A, MXDA, Benzyl alcohol free.



Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>ALIPHATIC AMINE TYPE</b>									
93003	Accelerated Polyamine	100 - 400	< 6	960	34	100	18	20'	Fast curing adhesives, impregnation, mortars and coatings. High HDT.
9943	Accelerated Polyamine	2000 - 5000	< 5	910	38	100	20	10"	High Solvent resistance and high HDT. Suggested for coatings putties and repair compounds.
9345	Modified Polyamine	400 - 700	< 12	375	95	100	50	55'	Hardener for epoxy adhesives, reduced labelling requirement.
9348	Modified Polyamine	130 - 370	< 3	225	95	100	50	80'	Low viscosity hardener, for casting, impregnations, injections. Long pot life.
9352	Modified Polyamine	800 - 1500	< 12	350	105	100	55	350'	Hardener for epoxy and epoxy-PU system not labelled hazardous.
9353	Modified Polyamine	350 - 750	< 6	600	95	100	50	5'	Used as accelerator or fast curing adhesive (chemical anchoring bolts).
9355	Modified Polyamine	100 - 400	< 5	730	47	100	25	10 - 15'	For marble treatment and impregnation, for automatic systems curing in the oven.
930	Isolated Adduct	1000 - 2000	< 9	90	165	50	80 - 90 <sup>a</sup>	1 d*	Solvent based coating. Good gloss, hardness and chemical resistance.
941	Modified Polyamine	50 - 150	< 2	800	47	100	25	20'	For marble treatment and impregnation.
941 NF	Accelerated Polyamine	150 - 350	< 2	640	95	100	50	14'	Fast curing, mainly used for epoxy - PU adhesives.

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>POLYAMINOAMIDES TYPE (reactive polyamides)</b>									
9100 x 60	Xylene Solution	3500 - 5500	< 12	90	807.5	60	170 <sup>a</sup>	2:3d	Anticorrosive primers, zinc rich primers and top coats. Good adhesion and chemical resistance.
9115	Standard polyamide	50000 - 60000	< 12	250	247	100	100-120 45-60 <sup>a</sup>	180' 2:3d	Anticorrosive primers, zinc rich primers and top coats. Good adhesion and chemical resistance.
9115 x 70	Xylene Solution	800 - 1800	< 12	175	344:375	70	65-80 <sup>a</sup>	2:3d	Anticorrosive primers, zinc rich primers and top coats. Good adhesion and chemical resistance.
9125	Standard polyamide	70 - 900 (75°C)	< 12	360	285	100	50:70 30:40 <sup>a</sup>	125' 1:2d	High solids solvent free systems for anti-corrosives, putties, mortars, civil engineering and sealants. Good flexibility.
9140	Standard polyamide	300 - 600 (75°C)	< 12	395	285	100	50:70 30:40 <sup>a</sup>	105' 1:2d	High solids solvent free systems for anti-corrosives, putties, mortars, civil engineering and sealants. Good hardness.
9302	Polyamide Adduct	500 - 1000	< 15	320	114	100	60	150'	For solvent free and high solid systems.
970422	Polyamide Adduct	4000 - 7500	< 12	185	-	70	70 <sup>a</sup>	10:12h*	%70 solid content adduct for solvent based primers and top coats. Good performance under adverse conditions.
9225	Polyamide Adduct	800 - 1400	< 12	135	-	60	80:110 <sup>a</sup>	10:12h*	%60 solid content adduct for solvent based primers and top coats. Good performance under adverse conditions.
9450 BAF	Polyamide Adduct	1500 - 3000	< 12	400	114	100	60	150'	Solvent free systems and water dilutable for concrete, bonding new/old concrete.
9460 i 90	Polyamide Adduct	2000 - 6000	< 12	250	190	90	100	100'	Coatings and adhesives, in extreme conditions of moisture and under water.
9250	Polyamide Imidazoline	500 - 1200	< 12	400	95	100	50	100'	For coal tar epoxy systems, flooring and coatings. Good reactivity.
9418	Accelerated Polyamide	1300	< 12	540	95	100	50	40'	Good reactivity and mechanical resistance, adhesion, sand-ability.

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**S:** Accelerated version. **BAF:** Benzyl alcohol free. **BABMF:** Bisphenol A, Benzyl alcohol, MXDA free.  
**BF:** Bisphenol A free. **BMF:** Bisphenol A. MXDA free. **SBMF:** Accelerated version, Bisphenol A, MXDA free.  
**MF:** MXDA free. **BABF:** Bisphenol A, Benzyl alcohol free. **SBABMF:** Accelerated version, Bisphenol A, MXDA, Benzyl alcohol free.  
a: in combination with epoxy resin EEW = 474. \*: in clear lacquer %40 dry content (d = days)

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>VARIOUS TYPE</b>									
9960	Tertiary amine	100 - 500	< 9	625	-	100	-	-	Accelerator for epoxy systems.
98231	Modified Polyamine	400 - 1000	< 4	390	76	100	40	16'	Very good adhesion on glass and ceramic. Fast curing and high chemical resistance.
98232	Cycloaliphatic Adduct	100 - 300	< 2	325	95	100	50	30'	Very good adhesion on glass and ceramic. High gloss, levelling and distension.
98233	Modified Polyamine	400 - 900	< 8	290	114	100	60	40'	Very good adhesion on glass and ceramic. Very good performance in high humidity.
98235	Modified Cycloaliphatic	100 - 300	< 3	400	95	100	50	20 - 25'	Very good adhesion on glass and ceramic. Good chemical resistance.

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>HARDENERS FOR WATER BASED SYSTEMS</b>									
9660	Amine Adduct	15000	< 8	205	195	80	100	150'	For coatings and epoxy and cement. Good reactivity, high gloss.
9360	Polyamide	45000	< 12	170	190	50	100	60'	Anticorrosive primers, zinc rich primers, top coats. Good adhesion and chemical properties.
9450 BAF	Polyamide Adduct	1500 - 3000	< 12	400	114	100	60	150'	Water dilutable for concrete, bonding new/old concrete.

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	Mix Ratio	Pot Life	
<b>PHENALKAMINESS TYPE</b>									
93440	Phenalkamine	1000 - 4000	< 15	490 - 550	81	100	30-45	30 - 45'	Marine and industrial maintenance coatings. Potable water applications.
93441	Phenalkamine	17000 - 35000	< 17	290 - 325	130	100	65-75	50 - 70'	Marine and industrial maintenance coatings for medium solids.
93442	Phenalkamine	1000 - 5000	< 17	320 - 345	125	100	65-80	50 - 70'	%100 solids coatings for flooring application under cold and damp conditions.
93558	Phenalkamine	500 - 1500	< 17	320 - 360	100	100	55	40'	%100 solids coatings for flooring application under cold and damp conditions. Primers for concrete.
93562	Phenalkamine solution	300 - 2300	< 16	210 - 240	174	65	65-80	50 - 70'	65 % solid content, good corrosion & water resistance. Low temperature cure. Ideal solution for general purpose industrial epoxy systems as well as extending the painting window.

Razeencure®	Description	Chemical properties							REMARKS
		Viscosity	Colour Gardner	Amine Value	AHEW	Solids %	EEW 190	Pot Life	
<b>PURE AMINE TYPE</b>									
921	TMD	5 - 10	< 2	600 - 630	40	100	21	-	Trimethyl hexamethylene diamine, aliphatic diamine. Main component for curing agent formulations, cold and heat curing of epoxy resin systems.
931	DETA	4	< 2	1626	21	100	11	-	Rapid cure - typically being phased out on toxicology concerns. Still used for rapid set applications including rock bolt adhesives, stone repair and fast return to service repair putties.
932	TETA	20 - 40	< 2	1400	23	100	12	28'	Typically being used to replace DETA as safer alternative but slower.
933	MXDA	10 - 20	< 2	824	32	100	17	-	
934	AEP	10 - 20	< 2	-	44	100	21	95'	
938	TEPA	10 - 20	< 2	-	27	100	14	-	
940	Polyetheramine 230 type	9 - 50	< 2	450 - 490	63	100	33	300'	Low viscosity, vapour pressure; moderate heat post cure needed to get best result. High impact resistance, good low temperature flexibility, thermal shock and abrasion resistance. Typical applications include coatings, castings, adhesives, composites, polymer concrete, syntactic foams.
942	IPDA	15 - 25	< 2	650 - 670	40	100	21	95'	Can be used to formulate/optimize amino hardeners for epoxy systems or on its own. It is also suitable for composites, pipes and pultrusion systems.

**AHEW:** Active Hydrogen equivalent weight. **Mix Ratio:** with a resin of EEW = 190 **Pot Life:** sample of 150 g at 25 °C.

It is the responsibility of customer to satisfy himself that the product is suitable for the intended use. All information in this brochure is without guarantee.



# Razeen Cure

## Hardeners for hybrids and powder epoxy systems:

Razeencure®	Reactivity	Tg (°C)	REMARKS
<b>PHENOLIC TYPE HARDENERS</b>			
Phenolic curing agents with a melting range of 60 – 70 °C, viscosity of H-M (Gardner) and hydroxyl equivalent of 30 ± 250 g/Eq. Suitable for a wide variety of powder coating applications. We recommend choosing a suitable combination of reactivity and Tg for your needs.			
3080	+	50	Phenolic hardener containing a polyacrylate flow modifier and accelerator. Designed for powder coatings is totally compatible with epoxy resins. Suitable for formulations where is needed a good flow (decorative), protective and high gloss coatings. Moderate reactivity.
3081	++	50	Phenolic hardener containing a polyacrylate flow modifier and accelerator. Designed for powder coatings is totally compatible with epoxy resins. Suitable for formulations where is needed a good flow (decorative), protective and high gloss coatings. Medium reactivity.
3082	+++	50	Phenolic hardener containing a polyacrylate flow modifier and accelerator. Designed for powder coatings is totally compatible with epoxy resins. Suitable for decorative and protective formulations including functional coatings (fusion bonded epoxy). Relatively high reactivity.
3083	++++	47	Phenolic hardener containing a polyacrylate flow modifier and accelerator. Designed for powder coatings is totally compatible with epoxy resins. Suitable for decorative and protective formulations including functional coatings (fusion bonded epoxy). High reactivity.
3084	++	50	Phenolic hardener containing a polyacrylate flow modifier and accelerator. Designed for powder coatings is totally compatible with epoxy resins. Suitable for formulations where is needed a good flow (decorative), protective and high gloss coatings. Medium reactivity.
3085		52	Phenolic hardener no containing no flow modifier or accelerator. Designed for optimising powder coatings already containing an accelerator. Low reactivity.

<b>HARDENERS – Other type</b>		
Razeencure®	Chemical name	REMARKS
T - 105	B-Hydroxyalkyl amide	Curing agent for outdoor polyester coatings to replace TGIC systems.
T-105-M	B-Hydroxyalkyl amide. Contains degassing agent	Curing agent for outdoor polyester coatings to replace TGIC systems.

<b>ANHYDRIDE TYPE HARDENERS</b>										
Razeencure®	PHR	Tg	HDT	Impact Strength	Flexural Deflection	Flexural Strength	Flexural Modulus	Tensile Strength	Elongation At break	Tensile Modulus
		°C	°C	Kj/m <sup>2</sup>	mm	N/mm <sup>2</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	N/mm <sup>2</sup>
Epoxy resin: liquid bisphenol A type (EEW=190). PHR: grams of hardener for 100 g. of resin. Epoxy equivalent/anhydride equivalents = 1. BDMA 1 phr. Except as specified - Curing cycle= 4h @ 90 °C + 8h @ 130 °C. (1): Curing cycle = 2h @ 80 °C + 24h @ 150 °C + 24 h @ 250 °C. (2): Curing cycle = 2h @ 120 °C + 6h @ 150 °C Note: the value reported should be considered as indicative it is the user's responsibility to evaluate in his own system										
HHPA	80.2	139	134	1.41	12.5	153	2900	60	2.50	2500
M-THPA/NT	87.5	133	125	1.30	10.5	146	3050	53	2.00	2650
M-THPA/600	85	135	126	1.45	12.0	159	3000	57	2.30	2700
M-THPA/PI	87.4	141	136	1.30	11.0	147	2550	53	2.00	2450
M-HHPA /WW&SW	88.5	145	140	1.40	12.6	155	2750	55	2.25	2460
30/70	83.4	143	135	1.39	12.0	152	2925	58	2.40	2480
METH/E & /ES	92.6	131	124	1.48	11.5	171	3230			
METH/E & /ES (1)	92.6	196	190	1.68	7.40	104	2750	57	1.90	2930
THPA	80.0	138	136	1.24	12.6	151	2951	67	2.80	6940
AF(2)	78.0	149	147	1.24	12.1	163	3082	65	2.00	7920
CA	Curing agent for epoxy resins and provides the finished system with a number of unique properties as follows: Strength and stiffness at high temperatures. High Heat Distortion Temperature. Fire resistance. Excellent mechanical and physical properties. Refer to TDS & MSDS for more information.									
It is the responsibility of customer to satisfy himself that the product is suitable for the intended use. All information in this brochure is without guarantee.										



*Jana - the epoxy people*

Razeen Advance

Razeen Cure

**Razeen®**  
**رزین**